BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BE **SEMESTER : IV**
BRANCH: IT **SESSION : SP/19**

SUBJECT: IT4027 SCIENTIFIC COMPUTING

TIME: 3 Hours **FULL MARKS: 60**

INSTRUCTIONS:
1. The question paper contains 7 questions each of 12 marks and total 84 marks.
2. Candidates may attempt any 5 questions maximum of 60 marks.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Define order of convergence. [2]

Q.1(b) Evaluate 1/31, correct to 3 places of decimal, using the Newton Raphson method. [4]

Q.1(c) Find the positive root of the equation $x^3-3x+1.06=0$ by the bisection method correct to 3 significant figures. Show at least 5 iterations. [6]

Q.2(a) What are direct and iterative methods? [2]

Q.2(b) Using Newton's Forward Interpolation Formula calculate f (102) upto three decimal places in the table given below. [4]

x	93.0	96.2	100.0	104.2	108.7
f(x)	11.38	12.80	14.70	17.07	19.91

Q.2(c) Derive the cubic spline for the following data: [6]

x	0	1	2	3
y	2	-6	-8	2

Q.3(a) What is Trapezoidal rule? [2]

Q.3(b) Solve by using Euler's method, the following differential equation for x=0.6, taking h=0.2; dy /dx = xy, y=1 when x=0. [4]

Q.3(c) Find $\frac{d(J_0)}{dx}$ at x=0.1 from the following table: [6]

x	0	0.1	0.2	0.3	0.4
$J_0(x)$	1.0000	.9975	.9900	.9776	.9604

Q.4(a) Define Probability. [2]

Q.4(b) State and prove Bayes theorem. [4]

Q.4(c) A man is equally likely to choose any one of the three routes A,B,C from his house to the railway station, and his choice of route is not influenced by weather. If the weather is dry, the probabilities of missing the train by routes A,B,C are respectively 1/20,1/10 and 1/5. He sets out on a dry day and misses the train. What is the probability that the route chosen was C? [6]

Q.5(a) Define moment generating function. [2]

Q.5(b) Find the mean, variance and moment generating function of binomial distribution. [4]

Q.5(c) Write a note on: i. Uniform Distribution. ii. Exponential distribution. iii. Gamma distribution. [6]

Q.6(a) What is Central Limit Theorem? [2]

Q.6(b) If the distribution of F is F(4,9),constants c and d such that $P(F\leq c)=0.01$ and $P(F\leq d)=0.05$. Find c and d. [4]

Q.6(c) Let T have a t distribution with r=10 degrees of freedom. Determine $P(T\geq 2.228)$, $P(T\leq -2.228)$ and $P(-0.260<T<2.764)$ [6]

Q.7(a) What is confidence intervals for difference of two means? [2]

Q.7(b) Write a note on Confidence interval of mean. [4]

Q.7(c) 15000 random numbers were taken from some logarithm table and the following frequencies of each digit were obtained: [6]

Digit	0	1	2	3	4	5	6	7	8	9
Frequency	1493	1441	1461	1552	1494	1454	1613	1491	1482	1519

Use the x^2-test to assess the correctness of the hypothesis that each digit had an equal chance of being chosen.

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